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# SCRIBING SYSTEM FOR SEMICONDUCTOR DEVICES

## CLAIM(S)

A semiconductor wafer scribing system comprising: a storage means for storing the position data of multiple semiconductor chip regions, wherein at least one of the size and shape of the semiconductor wafer is different, and the structure data containing at least one of the size data and shape data; a scribing means for scribing the semiconductor wafer; said system being characterized in that the semiconductor wafer is scribed by successively transferring the structure data from the storage means to the semiconductor wafer.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention pertains to a system for scribing a semiconductor having the semiconductor chip regions with various sizes and shapes.

With the prior art manufacture of semiconductors, many semiconductor integrated circuits structured by many semiconductor chips or semiconductor elements are formed on the semiconductor wafer and the wafer is scribed into square semiconductor chips. Subsequently, the semiconductor chips are accommodated in a container and formed into the semiconductor device. Generally, on one same semiconductor wafer, the semiconductor chips of same type and same size are structured, and the scribing at equidistance is performed in the X direction and Y direction.

As the semiconductor technology advances, the semiconductor device has come to independently constitute an electrical circuit by itself, not as a constituent element of the prescribed electronic circuit. If it is simply a component, it can be mass produced to

lower the cost. However, an electronic circuit has to be designed individually according to the purpose, therefore, requires a production system wherein many different types are produced by a small amount for each type. Therefore it is necessary to streamline the production by arranging the semiconductor chips with various shapes on one same wafer. Accordingly, the prior art automatic scribing system, wherein the scribing was done at equidistance, has to be drastically changed, or an efficient production cannot be expected.

Based on this viewpoint, the present invention attempts to present a scribing system for efficiently manufacturing semiconductors, such as IC and LSI. The system is characterized in that it has a storage means for storing the position data of the multiple semiconductor chip regions, wherein at least one of the shape and size in the semiconductor wafer is different, and the structure data containing at least one of the size data and shape data, and in that the semiconductor is scribed by successively transferring the structure data from the storing means to the scribing means.

The present invention is explained in detail below. The method to automatically design an IC by a computer using a mask pattern of logic element and a mask pattern of logic circuit is recently increasing. In such a case, the manufacturing process of the IC uses one same method. However, in some cases, the shape of the IC chip varies depending on the type of IC. Also, the semiconductors are moving towards a larger diameter and IC chips are increasingly miniaturized in a recent trend. Therefore, even if the size of the electric circuit gets larger, the number of chips obtained from one sheet of semiconductor wafer is increased and the yield is improved in addition to it. Accordingly, the production is moving more and more toward the small amount of production; for example, in some cases, only some tens [the number between 10 and 90] of IC chips have only to be formed on one semiconductor wafer having a dimension for 500 IC chips. Also, in other cases, only a few IC chips are formed in the initial step of automatic designing the electronic circuit in order to evaluate and confirm the electronic circuit characteristics. It goes without saying that, in such a case, forming multiple types of electronic circuit, in other words, IC, on one same semiconductor wafer at one time will be efficient in production.

On the other hand, in recent years, a comprehensive management system for controlling the semiconductor device manufacturing by using a computer has been

developed. For example, as shown by a block diagram of Fig. 1, a large computer 1comprehensively manages the production amount of each type IC. In the subsequent mid-size computer 2, are input the data regarding the history of the specification of each type of IC and of each semiconductor wafer stored in the wafer process. In the small-scale computer, is stored the data for automatically operating the device directly connected to the small computer. Suppose, the manufacturing device directly connected to the small computer 3 is the scribing device 4. Then, the position data of the chip region on the wafer of the desired semiconductor to be scribed and the structure data containing at least one of the chip region size and the shape size are input from the mid-size computer 2 into the small computer 3. Then the data are successively scribed to the scribing device and scribed by laser. At this time, even if the shapes of the IC chips are not uniform, their positions are automatically determined by said data and automatically scribed since the pattern data of IC chips are input into small computer 3 as the semiconductor wafer as the composition data and recognized by the small computer 3.

Fig. 2 shows one composition example of the IC chip on the semiconductor wafer. For efficient use of the semiconductor wafer dimension, the larger chip regions, 5-1, 5-2, 5-6, are made in the center, and relatively smaller chip regions, 6-1, 6-2, 6-11, are made in the center. Once the pattern data containing the sizes of IC chips and/or shapes are thus recognized, the scribing can be performed by automatic operation of nozzle by the XY coordinate based on the standard point S. By this, it is not necessary to arrange the IC chips at equidistance, unlike the prior art, and it becomes possible to arrange the IC chip efficiently in the semiconductor wafer and structure multiple types of IC chips. Moreover, the preprocess of the scribing process in manufacturing the semiconductor device is a probe process, in which the quality of each IC chip is determined and input into the mid-size computer 2 via the small computer 3' (Fig. 1) directly connected to the probe test 4'. This quality data is input into the small computer 3 from the mid-size computer 2 simultaneously when the pattern data of the IC chip is input, so only the high quality chips are scribed without scribing the defective chips: thereby raising the operation efficiency and omitting an unnecessary operation.

As is evident from the above explanation, by the present invention, the IC chip shape on the semiconductor wafer can be selected more freely in the manufacturing

process of comprehensive control of a computer, contributing to a higher production efficiency of IC chips and to the lower cost. In the above explanation, a square chip was referred to as one example, but the scribing system of the present invention is applicable likewise even if the IC chip is formed in a circular shape.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a block diagram of the scribing method to which the present invention is applied. Fig. 2 shows a planar view of the semiconductor wafer for illustrating the semiconductor chips and shapes as one example.

1, 2, 3, 3'. computers

4. scribing device

4'. probe test device

5, 6. semiconductor chips